

Remarks

Claims 1, 3 and 5 are pending herein. By this Amendment, claims 2, 4 and 6 have been canceled, and claims 1, 3 and 5 have been amended.

Claim 1 has been amended to include the contents of canceled claim 2, and claim 3 has been amended to include the contents of canceled claim 4. Claim 5 has been amended to change the term “removes” to --reduces--. Support for the amendment to claim 5 can be found in the specification at, e.g., page 4, line 24 – page 5, line 10.

In the Office Action, claims 1 and 2 are rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 3,308,069 to Wadlinger et al. (“Wadlinger”); claims 3-5 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,374,410 to Grasselli et al. (“Grasselli”); and claim 6 is rejected under §103(a) as being unpatentable over Grasselli as applied to claims 3-5 above and further in view of U.S. Patent No. 5,336,476 to Kintaichi et al. (“Kintaichi”).

In view of the amendments and remarks herein, Applicants respectfully request reconsideration and withdrawal of the rejections set forth in the Final Office Action.

I. Rejection of Claims 1 and 2 Under 35 U.S.C. §102(b)

Claims 1 and 2 are rejected under §102(b) as being anticipated by Wadlinger. Wadlinger is cited for teaching a zeolite beta in hydrogen form having a silica:alumina ratio of between 10:1 to 200:1 (see columns 3, 5 and 7).

Claim 2 has been canceled and its contents incorporated into claim 1. Applicants respectfully submit that claim 1 is not anticipated by Wadlinger.

Wadlinger teaches the particular $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio of 10 to 200 relative to the composition of the reaction mixture used to form the zeolite beta, not to the zeolite beta itself. See col. 3, lines 64-67. Also note that the claims directed to the zeolite do not recite an $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio, whereas the claims directed to methods for making the zeolite do recite various $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratios.

Regarding the $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio of the zeolite beta, Wadlinger states at col. 4, lines 73-75 that:

the $\text{SiO}_2/\text{Al}_2\text{O}_3$ ratio is extremely high and extremely variable,
going from 10 to 100 and possibly as high as 150.

However, the “zeolite beta” in Wadlinger is very broad. For example, Wadlinger teaches that the compositions contemplated therein include not only the sodium form of

zeolite beta but also “crystalline materials obtained from such a zeolite by partial or complete replacement of the sodium ion with other cations” (see col. 5, lines 38-44). Wadlinger teaches that:

[t]he sodium cations can be replaced, at least in part, by other ions including those of metals below sodium in the electromotive series, calcium, ammonium, hydrogen and combinations of such ions with one another. Particularly preferred for such purpose are the alkaline earth metal ions; Group 2 metal ions, ions of the transition metals such as manganese and nickel, the rare earth metals such as cerium, lanthanum, praseodymium, neodymium, samarium and mixtures thereof with each other and the other rare earth; and other ions, for example, hydrogen and ammonium which behave in zeolite beta as metals in that they can replace metal ions without causing any appreciable change in the basic structure of the zeolite crystal. The transition metals are those whose atomic numbers are from 21 to 28, from 39 to 46 and from 72 to 78 inclusive, namely scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, yttrium, zirconium, niobium, molybdenum, ruthenium, rhodium, palladium, platinum, hafnium, tantalum, tungsten, rhenium, osmium and iridium [emphasis added] (col. 5, lines 44-63).

Applicants submit that Wadlinger does not teach a particular $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio range for the hydrogen form of the zeolite beta. As noted previously, Wadlinger teaches that the $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio of the zeolite beta is “extremely variable” (col. 4, lines 73-74).

To arrive at Applicants’ claimed catalyst, one skilled in the art reviewing Wadlinger would have to select a specific cation, i.e., hydrogen, from among those listed at col. 5, lines 44-63, to replace sodium ions in the zeolite beta and then select the specific $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratio of from 20-70 from $\text{SiO}_2/\text{Al}_2\text{O}_3$ molar ratios that are “extremely variable, going from 10 to 100 and possibly as high as 150” (col. 4, lines 73-75).

In order to anticipate, the reference must clearly and unequivocally disclose the claimed invention or direct those skilled in the art to the invention without any need for picking, choosing, and combining various disclosures not directly related to each other by the teaching of the cited reference. *In re Arkley*, 172 USPQ2d 524, 526 (CCPA 1972).

Applicants respectfully submit that Wadlinger does not anticipate Applicants’ claimed catalyst because the reference does not specifically disclose the combination of a proton type β zeolite and an $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratio of from 20 to 70, and that one skilled in the art would have to pick and choose among a long list of cations and a broad range of $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratios to arrive at the claimed catalyst.

Therefore, in view of the foregoing, Applicants respectfully submit that claim 1 is not anticipated by Wadlinger.

II. Rejection of Claims 3-5 Under 35 U.S.C. §103(a)

Claims 3-5 are rejected under §103(a) as being unpatentable over Grasselli. Grasselli is cited for disclosing a method for removing nitrogen oxides in waste gas streams, wherein nitrogen oxides present in gaseous effluents are converted into nitrogen and N₂O by reacting the effluents with a reducing agent in the presence of a zeolitic catalyst. Suitable reducing agents include methanol (col. 2, lines 55-68). Suitable catalysts include a zeolite beta in hydrogen form and having a silica:alumina ratio of at least 30:1 (col. 4, lines 45-65 and col. 6, lines 35-40).

Claim 4 has been canceled and its contents incorporated into claim 3. Applicants respectfully submit that claims 3 and 5 would not have been obvious over Grasselli.

The catalyst disclosed in Grasselli comprises a film of interconnected zeolite crystals bonded to a substrate surface (see, e.g., col. 2, lines 31-32, and col. 3, lines 21 – col. 4, line 2)). Grasselli teaches that:

Advantageously, in the catalyst structure for use herein the zeolite film is strongly bonded to the surface of a substrate so that the mechanical integrity of the film is maintained when the structure is exposed to high flow rates of gases or liquids. (col. 3, lines 3-7).

In the manufacture of the catalyst structure for use herein, a zeolite film is synthesized as bonded to a substrate. "Bonded" is intended to mean that the film is strongly adherent to the surface of a substrate and remains substantially adherent when subjected to conditions of catalysis, particularly high flow-through of gases and liquids. (col. 3, lines 28-34).

Thus, in Grasselli, the presence of the substrate is an important feature of the zeolite catalyst therein.

Claim 3 is directed to a method of purifying exhaust gas, wherein the method uses a catalyst consisting of a proton type β zeolite having a SiO₂/Al₂O₃ molar ratio within 20-70. Thus, the catalyst used in the method of claim 3 excludes the substrate present in the Grasselli catalyst.

Therefore, Grasselli does not teach or suggest the use of the catalyst set forth in claim 3.

Applicants further submit that Grasselli does not teach or suggest the catalyst used in the method of instant claim 5.

Regarding the zeolite catalysts produced by the method disclosed therein, Grasselli teaches that “[t]ypical zeolites to be synthesized according to this method are characterized by a Constraint Index of about 1 to about 12” (col. 4, lines 34-36). Regarding the $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratios for the zeolites produced therein, Grasselli teaches that:

These zeolites may be produced with differing silica:alumina ratios ranging from 12:1 *upwards*. They may, in fact, be produced from reaction mixtures from which aluminum is intentionally excluded, so as to produce materials having extremely high silica:alumina ratios which, in theory at least may extend *up to infinity*. Silica:alumina ratios of *at least 30:1* and higher will be common for these zeolites, e.g., 70:1, 200:1, 500:1, 1600:1 or even higher (col. 4, lines 52-61).
[emphasis added]

However, the Grasselli teachings cited above only relate to ZSM-type zeolites, not to proton type β zeolite catalysts. Regarding Zeolite Beta, Grasselli teaches that this zeolite has “a Constraint Index in the range of approximately 0.6-2.0” (col. 4, lines 65-67). However, this teaching does not relate to the $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratio of the Zeolite Beta. Grasselli does not teach any correlation between the Constraint Index of a zeolite and its $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratio. Thus, for at least this reason, Applicants respectfully submit that Grasselli does not teach or suggest a proton type β zeolite catalyst having an $\text{SiO}_2:\text{Al}_2\text{O}_3$ molar ratio of 20-70 or its use in purifying exhaust gas.

Therefore, Applicants respectfully submit that Grasselli does not teach or suggest the method of instant claim 5.

III. Rejection of Claim 6 Under 35 U.S.C. §103(a)

Claim 6 is rejected under §103(a) as being unpatentable over Grasselli as applied to claims 3-5 above and further in view of Kintaichi.

Claim 6 has been canceled. Thus, this rejection is moot.

IV. Conclusion

In view of the amendments and remarks herein, Applicants respectfully request that the rejections set forth in the Office Action be withdrawn and that claims 1, 3 and 5 be allowed.

If any additional fees, e.g., under 37 C.F.R. §§1.16 or 1.17, are due in connection with this filing, please charge the fees to Deposit Account No. 02-4300; Order No. 034145.002. Any overpayment can be credited to Deposit Account No. 02-4300.

Respectfully submitted,

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Enclosures: (1) Petition for Extension of Time
(2) Check for the sum of \$~~450~~ 630